

CASE REPORT

Concha bullosa of the inferior turbinate: an unusual cause of nasal obstruction

Concha bullosa del turbinato inferiore: inusuale causa di ostruzione nasale

B. PITTORE, W. AL SAFI, S.J. JARVIS

Department of Otorhinolaryngology, Head and Neck Surgery, Queen Alexandra Hospital, Portsmouth, UK

SUMMARY

Turbinate pneumatization, also known as concha bullosa, refers to the existence of an air cell inside the turbinate. While pneumatization of the middle and superior turbinates are common, the presence of pneumatization of the inferior turbinate, otherwise known as an inferior concha bullosa is very rare. Herewith, a case is presented of bilateral hypertrophy of the inferior turbinates associated with a left inferior concha bullosa.

KEY WORDS: Nose • Inferior turbinate pneumatization • Concha bullosa • Nasal obstruction

RIASSUNTO

La pneumatizzazione dei turbinati, nota anche come concha bullosa, si riferisce alla presenza di cellule d'aria all'interno dei turbinati. Mentre la pneumatizzazione del turbinato medio e superiore sono comuni, la presenza della pneumatizzazione del turbinato inferiore altrimenti nota come concha bullosa inferiore è molto rara. Noi presentiamo un caso di ipertrofia dei turbinati inferiori, associata alla presenza di una concha bullosa sinistra.

PAROLE CHIAVE: Naso • Pneumatizzazione del turbinato inferiore • Concha bullosa • Ostruzione nasale

Acta Otorhinolaryngol Ital 2011;31:47-49

Introduction

The turbinates are important structures arising from the lateral wall of the nose. There are normally three turbinates: the superior and middle turbinates are part of the ethmoid bone and the inferior turbinate is a separate bone in itself. The inferior turbinate bone also articulates with the ethmoid, palatine and lacrimal bones (completing the medial wall of the nasolacrimal duct). Occasionally there may be a fourth turbinate called the supreme turbinate.

The middle turbinate is smaller and projects downwards over the openings of the maxillary and ethmoid sinuses, and act as buffers to protect the sinuses from coming into direct contact with pressurized nasal airflow. Most of the inhaled airflow travels between the inferior turbinate and the middle turbinate. The inferior turbinate is the largest turbinate, and is responsible for the majority of airflow direction, humidification, heating, and filtering of air inhaled through the nose. Turbinates are composed of a pseudostratified columnar ciliated respiratory epithelium with a thick, vascular and erectile glandular tissue layer.

Large, swollen turbinates may lead to blockage of nasal breathing. Allergies, exposure to environmental irritants, or a persistent inflammation within the sinus, can lead to turbinate swelling¹. Deformity of the nasal septum can also result in enlarged turbinates¹. Less common, an enlargement of the inferior turbinate can be due to the presence of a concha bullosa (CB)²⁻⁸.

Case report

A 24-year-old female came to our attention complaining of a 4-year history of rhinorrhoea and nasal obstruction. She has a history of snoring and frequent sneezing and is also asthmatic. Clinical examination showed large turbinates that were abutting the septum. She was treated with xylometazoline and mometasone without improvement in her symptoms. She was referred to the Otorhinolaryngology allergy clinic and skin prick tests were positive for dog and house dust mite. A computed tomography (CT) scan of her paranasal sinuses was performed. This showed a small amount of polypoid mucosal thickening bilaterally in the maxillary antrum and ethmoid air cells. The left infundibulum was occluded due to apposition of the left uncinate process and a Haller cell. The inferior turbinates were hypertrophic and a concha bullosa was visible on the left side (Figs. 1, 2).

The patient underwent functional endoscopic sinus surgery under general anaesthetic. Intra-operative examination showed hypertrophy of the inferior turbinates (Fig. 3). A 4 mm 0 degree rigid endoscope was used and the inferior concha bullosa (ICB) was resected removing the free edge of the inferior turbinate using turbinectomy scissors (Fig. 4). The uncinate process was removed and a middle meatal antrostomy was performed bilaterally. Nasal douching with isotonic sterile saline solution was prescribed, three times a day, for 10 days. The patient was reviewed in the Clinic after one month and her nasal obstruction had improved significantly.

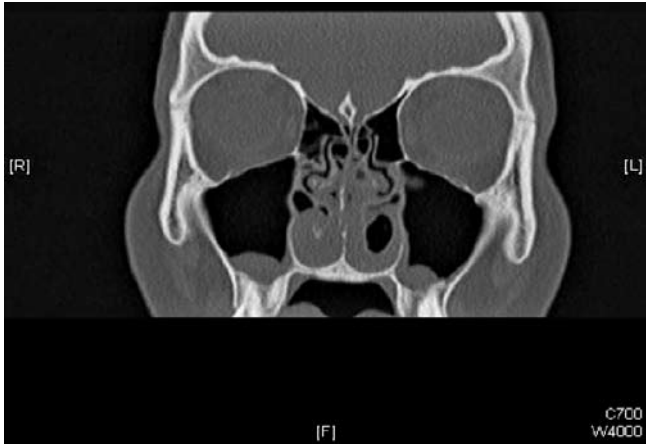


Fig. 1. Coronal CT scan shows hypertrophic inferior turbinates with left concha bullosa.

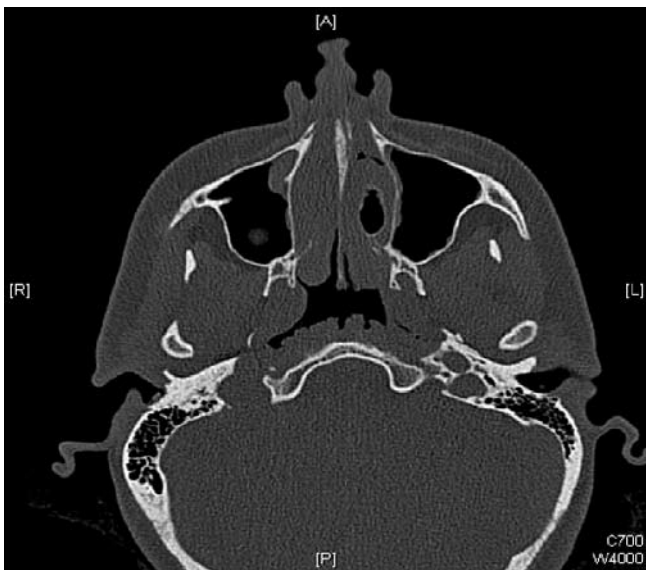


Fig. 2. Axial CT scan shows hypertrophic turbinates with left concha bullosa.

Discussion

The inferior turbinates are the largest of all the turbinates, and are responsible for the majority of airflow direction, humidification, heating, and filtering of air inhaled through the nose. Usually enlarged inferior turbinates are the result of infections, allergies, exposure to irritants, such as cigarette or cigar smoking, vasomotor rhinitis and chronic infection in the sinuses. A deviated nasal septum may cause compensatory enlargement of the contralateral turbinate. It is very unusual for enlargement of the inferior turbinate to be due to an ICB. One of the most important hypotheses regarding the aetiology of the ICB is correlated with its embryology. The inferior turbinate has two chondral lamella and two separate ossification centres. These appear between the 5th and 7th months of foetal development and fuse by the 9th month. During this period, the epithelium may invaginate into the double lamella and form a potential CB³⁻⁹. Another hypothesis suggests that during foetal life, maxillary sinus pneumatization extends into the inferior turbinate⁵. Yang et al. found this correlation in 8 out of 18 ICBs (44%)¹⁰.

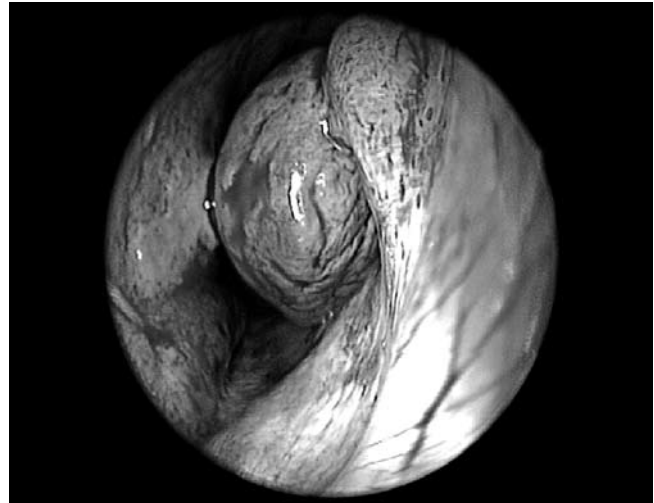


Fig. 3. Enlargement of the left inferior turbinate due to a concha bullosa.

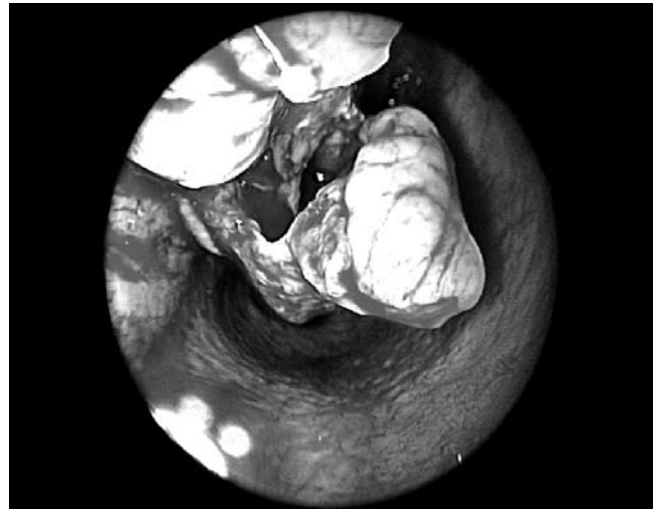


Fig. 4. Intra-operative view showing the air cell inside the left inferior turbinate.

In 1988, Zinreich et al. were the first to recognise ICB as an anatomical variant of the turbinates¹¹.

Only a few papers, in the English literature, describe ICB and most of these have appeared as case reports^{1,3,4,7,8}. Aydin et al. described two cases of ICB, one of which was diagnosed incidentally during a CT scan performed for a mass of the hard palate. The other patient complained of nasal obstruction, sneezing, nasal discharge and facial pain due to bilateral ICB². Christmas et al. described three cases of ICB presenting with nasal obstruction⁶. Yang et al. described a large retrospective study of 59,238 paranasal CT scans and found 16 to have ICB, two of which bilateral¹⁰.

ICB is normally asymptomatic and diagnosed incidentally upon imaging²⁻⁵. It can, however, when there is extensive pneumatization, cause nasal obstruction^{1-5,9,12} as in our case. Other symptoms associated with ICB are nasal discharge, nasal discomfort with coexistent infection, headache and epiphora^{8,12-14}. Clinically, it is virtually impossible to differentiate between hypertrophy of the inferior turbinate and an ICB. Use of vasoconstrictor drugs may be useful in the clinical setting to differentiate between a CB and reversible mucosal disease.

Definitive diagnosis is made with a CT scan of the sinuses. Bolger et al. classified CB of the middle turbinate into three types: pneumatization of the vertical lamella, pneumatization of the inferior bulbous and "true" CB that include both¹⁵. In our case, the pneumatization was localized in the inferior bulbous of the inferior turbinate. Treatment of the ICB is indicated only when it is symptomatic. The goals of treatment are to maximize the nasal airway, to preserve nasal mucosa function, and to minimize complications. Medical treatment such as steroid nasal sprays may be attempted, but often are not successful in these cases and surgery is required. Many surgical techniques have been described such as out-fracture of the inferior turbinate and crushing of the ICB with forceps, excision of the free edge of the inferior turbinate using turbinectomy scissors, submucosal diathermy and turbinoplasty with the use of the microdebrider^{3-5,16}. A concha that is pneumatized anteriorly without any posterior involvement can be treated by partial turbinectomy, removing only the anterior portion preserving as much of the turbinate as possible. Curved scissors should be placed at the neck of the turbinate just above the bulge of the area of the pneumatization with the curve pointing inferiorly. In the event of very large pneumatization, a lateral turbinectomy may be used as described by Dogru et al., in 1999. They described resection of the ICB removing the lateral aspect of the inferior turbinate⁹ and since then

many other Authors have used this method^{7,8}. Although this technique is easy and quick to perform, it is contraindicated where there is a communication between the ICB and maxillary sinus, because it can produce an inferior meatal antrostomy leading to mucociliary recirculation problems⁹. Unlu et al. suggest making a vertical incision with a sickle knife, along the antero-inferior surface of the turbinate and then they use Blakesley-Wilde forceps to remove the inferior mucosa from ICB⁵. In small CB, crushing may be enough to alleviate nasal obstruction. In this technique, the turbinate is grasped with pituitary forceps or using a Freer dissector inserted between the septum and the turbinate and directed laterally to crush the turbinate against the lateral wall or inserting the Freer dissector lateral to the CB and crushing it against the septum¹⁷. Total turbinectomy is contraindicated because it can increase the risk of the patient developing atrophic rhinitis, in particular in hot and dry climates¹⁸.

Conclusions

ICB is a rare entity. It is usually diagnosed incidentally on CT scan, but can, as in our case, present with nasal obstruction. ICB must be considered as a potential cause of nasal obstruction, in particular when there is no response to vasoconstrictor drugs. It is best treated surgically and there are various techniques for resecting the ICB.

References

- Ingram WA, Richardson BE. *Concha bullosa of an inferior turbinate*. Ear Nose Throat J 2003;82:605-7.
- Aydin Ö, Üstundağ E, Çiftçi E, et al. *Pneumatization of the inferior turbinate*. Auris Nasus Larynx 2001;28:361-3.
- Çankaya H, Egeli E, Kutluhan A, et al. *Pneumatization of the concha inferior as a cause of nasal obstruction*. Rhinology 2001;39:109-11.
- Özcan C, Görür K, Nass Duce M. *Massive bilateral inferior concha bullosa*. Ann Otol Rhinol Laryngol 2002;111:100-1.
- Unlu HH, Altuntas A, Aslan A, et al. *Inferior concha bullosa*. J Otolaryngol 2002;31:62-4.
- Christmas DA, Marrell RA, Mirante JP, et al. *Pneumatized inferior turbinate: report of three cases*. Ear Nose Throat J 2004;83:152-3.
- Uzun L, Ugur MB, Savranlar A. *Pneumatization of the inferior turbinate*. Eur J Radiol 2004;51:99-101.
- Kiroglu AF, Çankaya H, Yuca K, et al. *Isolated turbinitis and pneumatization of the concha inferior in child*. Am J Otolaryngol 2007;28:67-8.
- Doğru H, Doner F, Uygur K, et al. *Pneumatized inferior turbinate*. Am J Otolaryngol 1999;20:139-41.
- Yang BT, Chong VFH, Wang ZC, et al. *CT appearance of pneumatized inferior turbinate*. Clin Radiol 2008;63:901-5.
- Zinreich SJ, Mattox DE, Kennedy DW, et al. *Concha bullosa: CT evaluation*. J Comput Assist Tomogr 1988;12:778-84.
- Dawlaty EE. *Inferior concha bullosa. A radiological and clinical rarity*. Rhinology 1999;37:133-5.
- Namon AJ. *Mucocele of the inferior turbinate*. Ann Otol Rhinol Laryngol 1995;104:910-2.
- Göçmen H, Oğuz H, Kürşat Ceylan ES. *Infected inferior turbinate pneumatization*. Eur Arch Otorhinolaryngol 2005;262:979-81.
- Bolger WE, Butzin CA, Parsons DS. *Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery*. Laryngoscope 1991;101:56-64.
- Ozcan KM, Gedikli Y, Ozcan I, et al. *Microdebrider for reduction of inferior turbinate: evaluation of effectiveness by computed tomography*. J Otolaryngol Head Neck Surg 2008;37:463-8.
- Cannon CR. *Endoscopic management of concha bullosa*. Otolaryngol Head Neck Surg 1994;110:449-54.
- Clement WA, White PS. *Trends in turbinate surgery literature: a 35-year review*. Clin Otolaryngol 2001;26:124-8.

Received: July 20, 2009 - Accepted: November 8, 2009 - EPUB: December 29, 2010

Address for correspondence: Dr. B. Pittore, Department of Otorhinolaryngology, Head and Neck Surgery, Queen Alexandra Hospital, Cosham, Portsmouth, Hampshire, PO6 3LY, UK. Fax: 02392286000 ext 6708. E.mail: barbarapitt@tiscali.it